Thin germanium oxynitride gate dielectric for germanium-based devices

ABSTRACT OF THE INVENTION

A method for producing thin, below 6nm of equivalent oxide thickness, germanium oxynitride layer on Ge-based materials for use as gate dielectric is disclosed. The method involves a two step process. First, nitrogen is incorporated in a surface layer of the Ge-based material. Second, the nitrogen incorporation is followed by an oxidation step. The method yields excellent thickness control of high quality gate dielectrics for Ge-based field effect devices, such as MOS transistors. Structures of devices having the thin germanium oxynitride gate dielectric and processors made with such devices are disclosed, as well.